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**US Nuclear Weapons Modernization**

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The US last detonated a nuclear weapon in 1992 in an underground test in Nevada. By 1994, the Department of Energy's National Nuclear Security Administration (NNSA) launched its science-based stockpile stewardship program (SSP) designed specifically to ensure the safety, security, and effectiveness of US nuclear weapons without underground nuclear testing. Today, 24 years later, the scientists and engineers at NNSA's national laboratories and associated facilities, have succeeded at this task by a thorough modernization of tools, methods, and ideas about stewarding nuclear weapons. Key enablers were development and employment of specific new experimental capabilities, creation of modern, 3D weapon simulation codes, and investment in high-end supercomputers. This was also a period when cold-war stockpiles declined in size and military requirements for nuclear performance were stable. Looking ahead to the next generation of SSP, issues of responsiveness, agility, and efficiency of the nuclear weapons enterprise led the departments of Defense and Energy to seek a stockpile with fewer weapon types, while maintaining current capabilities. Called the "3+2" strategy, it envisages three sets of "interoperable" nuclear components serving both Air Force ICBMs and Navy SLBMs, and two air- delivered weapons. However, nuclear threats worldwide are quite different today compared to 1992-94, with more players and, potentially, greater threats. Nuclear policy is being reexamined by the new administration. Will "3+2" remain the program of record or be replaced? What is known is our SSP approach, without nuclear testing, works. High performance computing may experience limits to growth, while new experimental approaches may be coming into focus to address key performance questions definitively in non-explosive nuclear experiments. Continuous improvement— modernization—of SSP will remain crucial to US deterrence and, perhaps someday, control of these threats to humanity.